FINAL

HATCHIE RIVER BASIN

LAND TREATMENT PLAN

TENNESSEE

PREPARED BY

U.S. DEPARTMENT OF AGRICULTURE'S
SOIL CONSERVATION SERVICE
FOREST SERVICE

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SUMMARY OF PLAN

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The Project Setting, Problems and Opportunities Identification and Inventory and Forecasting sections of this plan address the entire Hatchie River Basin. The balance of the plan, including the recommended plan, addresses only the Tennessee portion.

Description of Recommended Plan: The recommended plan outlines a cost-effective, accelerated land treatment plan for the planning and application of land treatment practices on 192,140 cropland acres, 9,350 acres of large gullies and degrading ditches and 430 acres of eroding roadbanks in Tennessee. Total installation costs are estimated at $37,962,610. This includes $29,559,400 in other funds and $8,403,210 in local funds. The benefit-cost ratio is estimated at 1.6:1.0.

Alternatives Considered: A no project action plan and a plan providing for the control of excessive upland cropland erosion and the stabilization of large gullies, degrading ditches and eroding roadbanks in Tennessee were considered.

Resource Information:

Size of Basin		-	1,664,600 acres
Acreage in Tennessee		-	1,195,070 acres
Land Use in Tennessee	Cropland	-	386,590 acres
	Grassland	-	174,010 acres
	Forestland	-	437,580 acres
	Other	-	196,890 acres

Problem Identification - Annual on-site and off-site damages of over $10.5 million result from excessive soil erosion on cropland throughout the basin. On-site and off-site damages were quantified and evaluated in monetary and nonmonetary terms. Monetary damages are realized through reduced crop yields, increased production costs, timber killed, land voiding and depreciation and increased maintenance costs. Nonmonetary damages are realized through water quality degradation, decreased wildlife habitat and adverse effects to aquatic ecosystems.

INTRODUCTION

This land treatment plan is one of three documents resulting from the Hatchie River Basin Special Study. It outlines a cost-effective accelerated land treatment plan for the Tennessee portion of the basin that significantly reduces on-site and off-site damages resulting from excessive erosion. Opportunities to resolve problems resulting from erosion and sedimentation in the Mississippi portion of the basin can be addressed through ongoing programs. These programs include Public Law 87-639 in the Tuscumbia River portion of the basin and the Public Law 83-566 watershed program in other watersheds.

The plan was developed by using basic prescribed procedures for the preparation of a land treatment plan for watershed protection under Public Law 83-566. This plan, however, is not eligible for implementation under Public Law 83-566, due to the size of the basin. Means that can be undertaken by local sponsors for implementation are outlined in the Recommended Plan Section of this document under Opportunities for Implementation.

A sediment transport analysis report and a hydrologic analysis report were also developed as a part of the overall study that was authorized and conducted under the provisions of Public Law 83-566 by the Soil Conservation Service. Assisting with the study were the Tennessee Department of Conservation (study sponsor), the Economic Research Service, Forest Service, and numerous other Federal and state agencies and organizations.

The Hatchie River Basin Special Study was preceded by a United States Department of Agriculture (USDA) comprehensive river basin, Type IV study completed in 1971. The initial river basin study report emphasized that problems resulting from excessive erosion and sedimentation were the basin's most serious resource-related problems. It also recommended that a basin-wide accelerated land treatment plan be developed and implemented.

The Tennessee Department of Conservation organized an interagency task force in December 1975 to initiate implementation of a Hatchie Scenic River Project. This action was taken after the Tennessee portion of the Hatchie River was designated as a Class I Natural River by the Tennessee General Assembly. The task force, consisting of representatives from 13 concerned organizations and state and Federal agencies, recommended that studies be initiated to specifically assess erosion, sedimentation and flooding and to analyze the main stem impacts incurred and anticipated as a result of land and water management projects and activities.

The Commissioner of the Tennessee Department of Conservation requested in June 1977 that the Soil Conservation Service and other agencies of the USDA conduct a special river basin study for the Hatchie River. The requested study was authorized in January 1982 after a plan for conducting the study was developed and approved in late 1981.

Selected definitions are provided in the Glossary in Appendix B for unfamiliar technical terms.

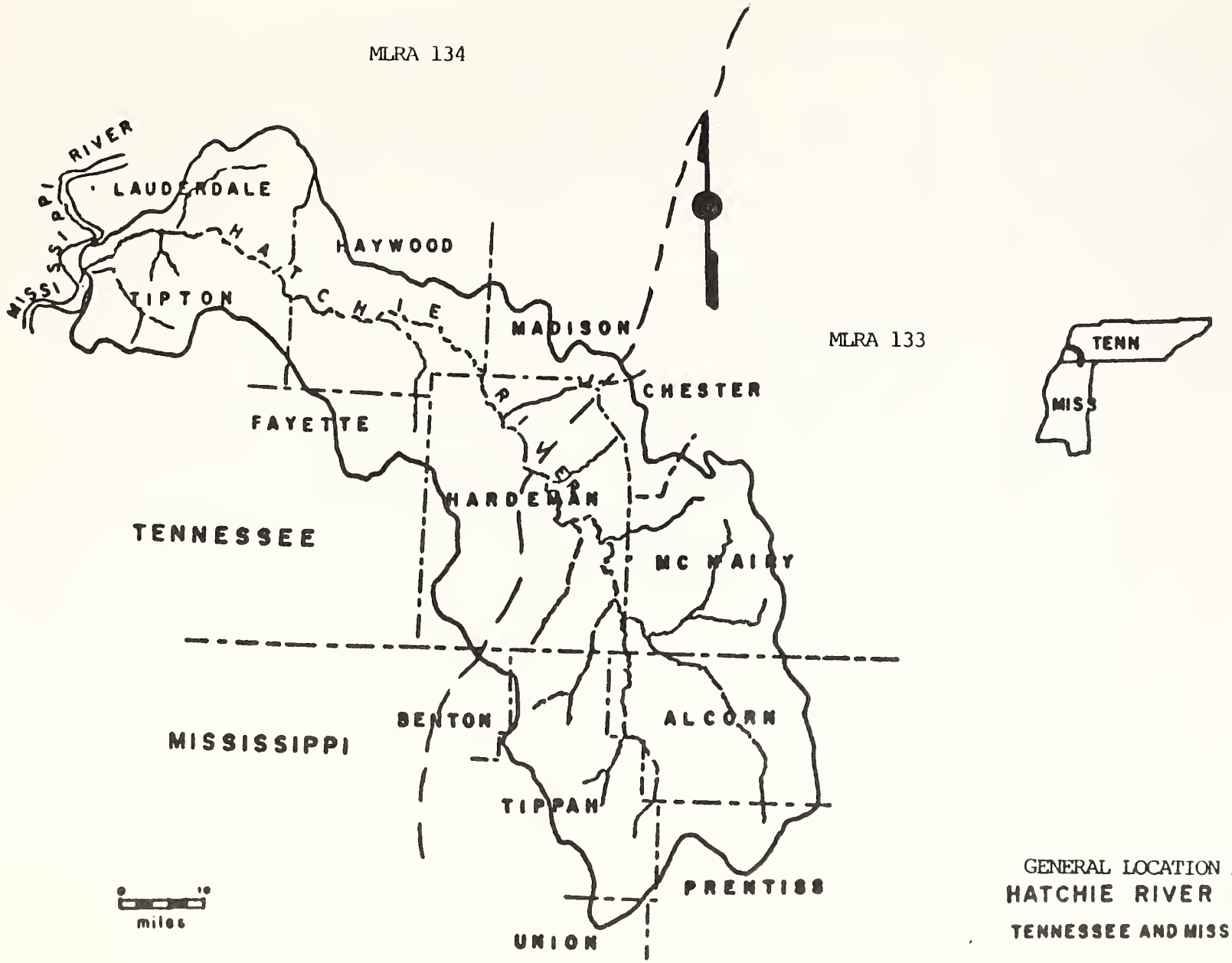
PROJECT SETTING

The Hatchie River Basin is located in southwestern Tennessee and northern Mississippi. The river begins in Mississippi and is joined near the Tennessee-Mississippi state line by the Tuscumbia River. A total of 36 major creeks join the river as it flows from the state line northwesterly across Tennessee to its outlet at the Mississippi River, 35 miles north of Memphis. The drainage area is about 110 miles long and averages about 24 miles wide, with a total acreage of 1,664,600 acres. Twenty-eight percent of the basin is in Mississippi including parts of Alcorn, Benton, Prentiss, Tippah and Union Counties (General Location Map). In Tennessee, the basin includes parts of Chester, Fayette, Hardeman, Haywood, Lauderdale, Madison, McNairy and Tipton Counties. The basin lies within two major land resource areas (MLRA) (General Location Map). It is about equally divided between the Southern Mississippi Valley Silty Uplands (MLRA 134) and the Southern Coastal Plain (MLRA 133). The two areas are distinctly different in their resource characteristics. Sixty-five percent of the basin's forests occur in the MLRA 133, while 66 percent of the croplands and 57 percent of the pasturelands occur within MLRA 134.

Topography of MLRA 134 is a sharply dissected plain with a thick loess mantle underlain by unconsolidated sands, silts and clays of marine origin. MLRA 133 is a gently to strongly sloping dissected plain with the same underlying formations. Stream valleys are narrow in upstream reaches, but the lower parts of the valley are broad and have widely meandering stream channels.

The basin includes primarily two geologic physiographic provinces: the West Tennessee Uplands and the West Tennessee Plain. The eastern one-third of the basin lies within West Tennessee Uplands, which is dissected and hilly, with some belts of rolling topography. Localized swamp conditions are present along many of the streams. Elevations range from 400 to 700 feet mean sea level. Most of the remainder of the basin lies within the West Tennessee Plain, which slopes gently westward from an elevation of 400 feet to 300 feet mean sea level. Topography is gently rolling, interrupted by small ridges and drainage divides. Some gullied topography has developed. Accelerated swampy conditions in the flood plain have resulted from erosion and the subsequent deposition of sediment.

The two physiographic provinces make up a portion of the eastern half of a larger geologic unit known as the Mississippi embayment of the Gulf of Mexico Coastal Plain. The Mississippi embayment now forms a trough filled with the old gulf sea sediments. The trough plunges to the south and follows the course of the Mississippi River. An arm of the gulf sea occupied the embayment for millions of years, and several thousand feet of sediment was deposited. Geologic units from Upper Cretaceous to Quaternary were deposited in the basin. Subsequent erosion has exposed these units. The formations consist primarily of gravel, sand, silt and clay. Windblown silt deposited in the Quaternary Age covers the western two-thirds of the area. The deposits of gravel and sand now form vast water-bearing aquifers, which produce large quantities of water.



GENERAL LOCATION MAP
HATCHIE RIVER BASIN
TENNESSEE AND MISSISSIPPI

The geologic formations strike north-northeast to south-southwest and dip to the west-southwest as shown on the geologic map (Appendix A). They are important in regard to the Hatchie Basin as several formations outcrop in the eastern one-third of the area and together with surface soils provide rapid rain infiltration. The result is several aquifers of abundant, high quality ground water supplies. Storm runoff is also reduced by this ground water infiltration.

The highly erosive nature of soils in the basin is directly related to soil formation from geologic materials. The following is a description of the general soil map units shown on the soils map (Appendix A):

1 - Memphis-Loring - This unit is mostly hills and ridges. The ridge-tops are narrow, winding and long. Crooked drains form deep, narrow valleys. The nearly level strips in the valleys are seldom more than 200 feet wide. The steep hillsides are most conspicuous. They have a slope range of 15 to 50 percent. The soils formed in deep silty deposits and are naturally fertile. Memphis soils are deep and well drained. Loring soils are moderately well drained and have a compact layer (fragipan) at a depth of approximately 28 inches.

About 80 percent of this unit is forest, and most of this is on the steeper slopes. The soils on the more gentle slopes are suited to a wide variety of crops. This unit has serious limitations for agriculture, because of the steep slopes and high erosion hazard of the soils. It has some limitations for residential and industrial development because of steep slopes.

2 - Grenada-Loring-Memphis - This unit is predominantly undulating to rolling. It consists of broad ridges that are gently sloping with strongly sloping side slopes and many small drainageways. The soils of this unit formed in silty deposits ranging from 5 to more than 20 feet thick. The moderately well drained Grenada and Loring soils have a compact fragipan layer at a depth of about 24 inches except in severely eroded ares where the depth to the fragipan is 18 inches or less. Severe damage from past erosion is common on the more sloping parts of the unit that have been used intensively for crop production. Approximately 80 percent of this unit has been cleared and used primarily for field crops such as cotton, soybeans, corn, hay crops and small grain. Only a small part is in pasture or forest.

3 - Falaya-Waverly-Collins - This unit forms the alluvial flood plains of the Hatchie River and its tributaries. All of the soils are subject to flooding, most commonly in winter and spring. The soils are silty and fertile. The Falaya and Waverly soils are not too wet for growing corn and soybeans if drainage is provided. About 75 percent of this unit is forest and produces many species of trees. These soils are highly responsive to management and well suited for wetland wildlife habitat. They have serious limitations for housing developments and road construction because of flooding, low strength and wetness.

4 - Memphis-Loring-Lexington-Smithdale - This unit is moderately dissected with narrow gently sloping ridgetops; steep side slopes and narrow bottoms along the many drainageways. The Memphis, Loring and Lexington soils are on the ridges where they formed in silty materials that range from 3 to 6 feet thick over unconsolidated loamy sediments. The Smithdale soils developed in loamy sediments on the steep hillsides. These soils are all well drained except Loring, which is moderately well drained. Severely eroded areas and gullies are common in this unit, especially on the steeper slopes. The gently sloping ridges and narrow bottoms are suited for crops such as cotton, soybeans, corn and pasture. Many small severely eroded areas are idle or reverting to woodland. Most of the steeper slopes are forested.

5 - Ruston-Cuthbert-Providence - This unit is predominantly hilly, with long, rolling ridges; long, steep and very steep side slopes and narrow stream bottoms. Ruston and Cuthbert soils are well drained. Providence soils are moderately well drained with a fragipan layer about 24 inches below the surface. Providence soils are on the rolling ridgetops. Ruston soils are on the ridgetops and on the upper part of the slopes. Cuthbert soils commonly are on the lower part of the side slopes. The ridgetops and the stream bottoms are suited to corn, cotton and soybeans and are moderately productive for these crops. Many of the steep side slopes have never been cleared of trees. Some areas that were cleared and plowed now have deep gullies. Many of the side slopes that were cleared are reverting to trees.

6 - Wilcox-Dulac-Falkner - This unit consists of wide, nearly level ridges, short side slopes and narrow stream bottoms. The ridges are several miles long and are mostly one-eighth to one-half mile wide. The gradient of the side slopes between the ridges and the stream bottoms is generally less than 17 percent. The moderately well drained Dulac and somewhat poorly drained Falkner soils are on the ridgetops. They formed in a silty mantle 1.5 to 3 feet thick and the underlying clayey Coastal Plain sediment. The well drained Wilcox soils formed in clayey sediment and are on the side slopes. Most of the unit has been cleared of trees and has been row cropped at some time. The ridgetops and the stream bottoms are suited to, and moderately productive for cotton, corn and soybeans. The steeper side slopes are not cultivated now and are reverting to trees. These soils have serious limitations for roads and buildings, because they shrink and swell with changes in moisture content.

The average annual rainfall over the basin is about 52 inches. October is the driest month, with an average of nearly 3 inches, and January is the wettest month averaging over 6 inches. About 59 percent of the annual rainfall occurs during the months of April through November. Generally, the winter rains are of several days in duration and extend over broad areas, but ordinarily the intensity is not severe. Rains of this type have caused the maximum floods to occur on the Hatchie River. Summer rains are usually of the thunderstorm type, with higher intensities, but cover smaller areas. Rains of this nature often cause flash flooding on tributaries of the Hatchie River. Monthly rainfall has ranged from a high of 19.4 inches in January 1937, to a low of 0.3 inches in September 1953. The average annual snowfall is approximately 4 inches. Snow seldom stays on the ground for more than a day or two at a time.

Agricultural lands, including forests, occupy 86 percent of the basin (approximately 1,430,780 acres). Of these, approximately 35 percent (504,690 acres) is cropland, 16 percent (230,010 acres) is grassland, and 49 percent (696,080 acres) is forest land. Other land occupies 14 percent (233,820 acres). Table A displays major land use for upland and bottomland by state.

TABLE A - MAJOR LAND USES BY UPLAND AND BOTTOMLAND (ENTIRE BASIN)

Hatchie River Basin Land Treatment Plan

Land Use	Upland			Bottomland			Basin
	Tennessee	Mississippi	Total	Tennessee	Mississippi	Total	Total
Cropland	337,870	96,840	434,710	48,720	21,260	69,980	504,690
Grassland	155,110	50,960	206,070	18,900	5,040	23,940	230,010
Forest Land	343,250	227,480	570,730	94,330	31,020	125,350	696,080
Other	159,970	22,530	182,500	36,920	14,400	51,320	233,820
Totals	996,200	397,810	1,394,010	198,870	71,720	270,590	1,664,600

Source: Soil Conservation Service Data

The forest land covers 42 percent of the basin. Eighty-two percent of the forest is in the upland, with the remaining 18 percent in the bottomland. The upland species include shortleaf and loblolly pine, red cedar, red and white oak groups, hickories, yellow poplar and sweetgum. The bottomland species are ash, cottonwood, black gum, tupelo and willow.

Forest and agricultural industries are important to the basin's economy. Numerous wood-using industries are located throughout the basin. Sawlogs, fuel wood and pulpwood are the primary forest products. Other products include veneer logs, poles, posts and miscellaneous industrial wood.

The most important row crops grown are soybeans, cotton, corn and wheat. Cattle, hogs, poultry, dairy and orchards are also important agricultural enterprises.

Population has fluctuated around 125,000 since 1930. The urban sector has almost tripled during this period. It is estimated that approximately 75,000 persons currently live in rural areas; and approximately 50,000 persons live in urban centers. Corinth, located in Alcorn County, Mississippi, is the basin's largest city. Other sizeable cities or towns include Selmer, Brownsville, Bolivar, Covington and Ripley, Tennessee.

PROBLEM AND OPPORTUNITY IDENTIFICATION

On-site and off-site adverse economic and environmental impacts result from excessive erosion on upland cropland, gullies, ditches and roadbanks.

Annual damages of over $10.5 million result from excessive soil erosion on 406,220 acres. Reasons for the excessive erosion include the following:

1. Prolonged production of row crops using conventional tillage methods.

2 Failure to cultivate on the contour.

3. Continued tillage of uplands not suitable for row crop production.

4. Insufficient resources, including cost-share and technical assistance, available for installation of land treatment practices.

5. Failure to maintain established land treatment practices.

On-site and off-site damages were quantified and evaluated in terms of either monetary or nonmonetary. Monetary damages are realized through reduced crop yields, increased production costs, timber killed, land voiding and depreciation and increased maintenance costs. Nonmonetary damages are realized through water quality degradation, decreased wildlife habitat and adverse effects to aquatic ecosystems.

Upland cropland with erosion rates greater than 5 tons per acre per year were identified and considered as problem areas. Upland gross erosion by major land use is shown in Table B. Annual damages by major land use are displayed in Table C.

INVENTORY AND FORECASTING

Scoping of Concerns

Numerous potential environmental, economic, cultural (archaeological and historical) and social concerns significant to decision-making were identified and evaluated early in the planning process during scoping activities. Field examinations and surveys by SCS and FS personnel and interagency groups confirmed and prioritized basin problems and needs. Concerns concluded to be of significance to decision making are outlined in Table D and are further addressed in this document. Data supporting these conclusions are contained in the supporting data files.

Existing Resources

Fish and wildlife habitats are generally good. In addition to privately-owned habitats and extensive bottomland forests, the Hatchie National Wildlife Refuge provides over 11,000 acres of wildlife sanctuary around Brownsville, Tennessee.

Over 200 species of birds, about 50 mammal species and several reptiles, amphibians and invertebrates occur in the basin. Waterfowl migrations peak in the area in December and January, while nesting populations of Canada

TABLE B - UPLAND GROSS EROSION BY LAND USES (ENTIRE BASIN)

Hatchie River Basin Land Treatment Plan

Land Use	5 Tons or Less/Acre		Greater Than 5 Tons/Acre		Total	
	Acres	Annual Erosion (Tons)	Acres	Annual Erosion (Tons)	Acres	Annual Erosion (Tons)
Cropland	50,180	116,000	384,530	16,537,000	434,710	16,653,000
Grassland	206,070	428,100	--	--	206,070	428,100
Forest Land	570,730	292,500	--	--	570,730	292,500
Other	160,820	238,500	8,510	118,300	169,330	356,800
Gullies & Ditches	--	--	12,430	1,401,100	12,430	1,401,100
Roadbanks	--	--	750	98,600	750	98,600
Totals	987,800	1,075,100	406,220	18,155,000	1,394,020	19,230,100

Annual damages, by major land use within the upland areas and off-site areas, are displayed in Table C.

TABLE C - ANNUAL DAMAGES BY MAJOR LAND USES (ENTIRE BASIN)

Hatchie River Basin Land Treatment Plan

Land Use or Condition	Identified Problem Acres 1/	Annual Damages (Dollars) 2/	Erosion Tons/Year
Cropland	384,530	9,284,860	16,537,000
Gullies and Ditches	12,430	559,060	1,401,100
Roadbanks	750	56,110	98,600
Other	8,510	-- 3/	118,300
Subtotal	406,220	9,900,030	18,155,000
Off-Site Crop and Pasture	45,380	612,550	--
Totals	451,600	10,512,580	18,155,000

1/ Includes only those acres with erosion rates greater than 5 tons per acre per year.

2/ Price Base: 1985, current normalized prices for crops.

3/ No monetary damages evaluated.

geese and native nesting populations of Wood duck occur year round. Starnes (1973) reported 106 species of fish, and this figure was increased to 111 by Sewell and Knight (1985).

TABLE D - EVALUATION OF IDENTIFIED CONCERNS (ENTIRE BASIN)

Hatchie River Basin Land Treatment Plan

Identified Concerns	Degree of Significance to Decision-Making 1/	Remarks
Soil Erosion - Sedimentation	High	Sponsor's Primary Concern
Cultural (Archeological and Historic) Resources	Low	
Rare, Threatened or Endangered Species	None	No Effect (See Appendix B)
Fish & Wildlife Habitat	Low	
Water Quality	Medium	
Wetlands	Low	
Important Agricultural Lands	Low	

1/ High - Must be considered in the analysis of alternatives.
Medium - May be affected by some alternative solutions.
Low - Consider, but is not very significant.
None - Need not be considered.

Aquatic habitat analysis revealed habitat quality indices (HQI's) varying from 0.80 (good) in unaltered tributaries to 0.52 (poor) in tributaries with past significant alteration.

About 545,930 acres of basin land are used for crop production. Major crops grown are soybeans, corn, cotton and wheat, with annual gross sales of about $120 million dollars. Approximately 434,700 acres (63 percent) of the total cropland acres are classified as upland. Approximately 384,530 acres (88 percent) were identified as having erosion rates in excess of 5 tons per acre annually.

Forest land covers almost 42 percent (696,080 acres) of the total basin. Over 85 percent is in farms and miscellaneous ownership; industry has 9 percent and National Forest and other public is 6 percent. The stand size is 41 percent sawtimber, 36 percent poletimber and 23 percent in sapling and seedlings. Ninety-one percent of the forest land is capable of growing 50 cubic feet or more of industrial wood. Ten percent is capable of growing 120 cubic feet or more.

Upland forest covers 570,730 acres or 41 percent of the upland in the Hatchie Basin. Overall annual soil loss in the upland area ranged from 0.1 to 2.0 tons per acre per year. Disturbed areas such as logging sites, spur roads and skid trails ranged from 3.6 to 28.6 tons per acre per year. Soil erosion due to forest practices appeared to be minimal and did not seem to be very serious when considered with other erosion in the basin.

Hardwood forests cover 125,350 acres or 46 percent of the Hatchie Basin bottomlands. There are 116,930 acres or 93 percent of the bottomland hardwoods classed as live and regenerated, and 8,420 acres or 7 percent classed as dead and fading. Hardwood timber damages from standing water and sediment deposits were calculated at $550 per acre or $4.6 million based on the average stumpage price per 1,000 board feet of unaffected timber (1985). Another 12,920 acres were cleared for agriculture and other uses. These cleared acre losses amounted to over 49 million board feet worth $7.1 million.

There are approximately 190,000 acres of wetlands. Wetland acreage was determined by remote sensing methods including the USDA-SCS Natural Resources Inventory (NRI) and mapping products of both the U.S. Geological Survey and the U.S. Fish and Wildlife Service (National Wetland Inventory). This effort resulted in an estimate of wetland acreage in each wetland type according to both recent and historic classification schemes (Appendix B). The acreage estimates are based on a representative sample of approximately 20 percent of the basin and are therefore subject to revision.

Wetlands occur along major waterways and are threatened by pollution from sediment deposition and associated influx of adsorbed chemicals and clearing operations which remove mast-producing trees. Most Hatchie River Basin wetlands are seasonally-flooded basins or flats characterized by broad-leaved deciduous or needle-leaved deciduous forests, which are temporarily or intermittently flooded. These overflow bottomlands provide major nesting or feeding areas for waterfowl in the Mississippi Flyway, especially during good mast-producing years. They also provide habitat for many furbearers, such as raccoon, opossum, mink, bobcat, skunk, beaver and gray fox.

All waters of the Hatchie River System described by the Tennessee Water Quality Control Board are classified for fisheries, irrigation, livestock water and wildlife uses. Several areas are additionally classified for contact recreation, domestic and industrial uses. In all, 95.3 percent of the Tennessee portion of the Hatchie River mainstem is classified for unrestricted use. An 8.8 mile reach from Hatchie River mile (HRM) 126.4 (Mill Creek) to HRM 135.2 (Spring Creek) is not suitable for domestic or recreational use. Water quality criteria vary for each of these uses, but generally include the following for the most sensitive organisms significant in the aquatic community: Dissolved oxygen greater than 5.0 mg l, pH between 6.0 and 9.0, fecal coliform bacteria less than 200 col/100 ml and instream concentrations of toxic pollutants less than 10 percent of the 96-hour lethal concentrations (LC50).

Current levels of phosphorus, fecal coliform bacteria and turbidity are high, especially in lower reaches. Using Station #5 (HRM 182.0) as an indicator, it can be hypothesized that increases in the levels of those parameters are related to increasing developmental activity including agricultural development. While no criteria could be located for DDT (and

metabolites DDD and DDE), concentrations in sediment [1/], it was established in neighboring waters [2/] that even low concentrations in sediment may produce concentrations in fish tissues in excess of those recommended for human consumption through biomagnification in aquatic food chains.

The gray bat, Myotis grisescens and the red-cockaded woodpecker, Picoides borealis were identified as endangered and threatened species (Appendix B). A thorough assessment was performed on these species in accordance with Section 7(c) of the Endangered Species Act of 1973 as amended. A finding of "no affect" was concluded and received concurrence from the U.S. Fish and Wildlife Service.

There are limited cultural (archaeological and historic) resources. Conservation practices will be recommended which will avoid adverse effects to identified and/or discovered properties in accordance with Part 400, Cultural (Archeological and Historical Resource) Resources, of USDA-SCS General Manual 420, and in cooperation with the State Historical Preservation Office (SHPO).

Forecasted Conditions

Significant problems are expected to remain in Tennessee, despite accomplishments anticipated through ongoing programs. Table E outlines (1) acres with erosion problems (future without accelerated assistance), (2) projected accomplishments under ongoing programs and anticipated accelerated accomplishments in Mississippi and (3) remaining annual damages.

No significant changes are anticipated on potentially prime upland cropland without additional project action. Total sediment damages are expected to decrease as a result of ongoing programs - however, significant damages will continue to be realized as untreated upland acres continue to erode excessively. Poor water quality will continue to exist and reduced stream flows due to in-stream sediment will continue to reduce fishery resources.

Wildlife bottomland habitat will generally degrade due to sediment damages. It will, however, improve on some bottomland and upland areas as cropland is converted to other uses. Wetland acreage will not be significantly altered, but classification shifts are anticipated resulting in net negative impacts.

Both the quality and quantity of bottomland hardwood forests will decrease due to clearing and sediment/water induced kills. Timber now classified as fading will die, and additional acreage will begin to fade in response to continued and longer-duration flooding along with swamping and sediment damages.

1/ EPA. 1976. Quality Criteria for Water. U.S. Environmental Protection Agency, Washington, D.C. 256 p.

2/ USDA - SCS. 1985. Water Management Plan for the Wolf and Loosahatchie River Basins. USDA Soil Conservation Service. Nashville, TN.

TABLE E - FUTURE PROBLEMS WITHOUT ACCELERATED ASSISTANCE (ENTIRE BASIN)

Hatchie River Basin Land Treatment Plan

Land Use or Condition	Existing Problems				Ongoing Programs[1]		Remaining Problems[2]		
	Total Basin		Tennessee Only						
	Acres	Erosion Tons/Yr. (1,000 tons)	Acres	Erosion Tons/Yr. (1,000 tons)	Acres	Reduced Erosion Tons/Yr. (1,000 Tons)	Acres	Erosion Tons/Yr. (1,000 Tons)	Annual Damages (Dollars)[3]
Upland									
Cropland	384,530	16,537	258,870	13,166	18,710	1,101	240,160	12,065	5,798,960
Gullies & Ditches	12,430	1,401	10,850	1,223	1,500	176	9,350	1,047	420,750
Roadbank	750	99	660	87	230	31	430	56	32,250
Other	8,510	118	8,300	115	1,460	67	6,840	48	--[4]
Upland Total	406,220	18,155	278,680	14,591	21,900	1,375	256,780	13,216	6,251,960
Off-Site									
Crop and Pasture	45,380	XXXX	36,750	XXXX	8,410	XXXX	28,340	XXXX	382,540
TOTALS	451,600	18,155	315.430	14,591	30,310	1,375	285,120	13,216	6,634,500

1/ Includes projected accomplishments of ongoing programs within Tennessee only.
2/ Remaining problems are those within Tennessee portion of basin only.
3/ Price base: 1985, current normalized prices for crops.
4/ No monetary damages were evaluated.

No change in rare plant and animal species is expected.

FORMULATION OF ALTERNATIVES

General

Formulation of alternatives, to solve identified problems, was guided by both economic development needs and opportunities to improve environmental conditions. Through consideration of the identified existing and projected problems, a set of basic objectives was determined. These basic objectives are as follows:

1. Maintain the long-term productive capacity of the soil resource base by reducing cropland erosion to acceptable rates.

2. Prevent additional economic losses from land voiding and depreciation by stabilizing gullies and degrading ditches.

3. Reduce maintenance cost and land voiding by stabilizing eroding roadbanks.

4. Reduce off-site damages by reducing amounts of sediment entering streams and channels.

5. Improve water quality and enhance fish and wildlife resources by reducing excessive soil erosion on all land uses.

Formulation Process

Basic planning criteria were established for formulating and evaluating alternatives. These criteria were based on the technical expertise contained in the following disciplines: agronomy, biology, soils, geology, economics and engineering. The process outlined below was used.

1. During the scoping process, it was concluded that:

   a. Priority should be given to treating upland cropland, gullies, degrading ditches and roadbanks having excessive erosion rates.

   b. Accelerated land treatment planning would only address the Tennessee portion of the Hatchie River Basin.

   c. The ongoing conservation programs would treat only about 10 percent of the total existing problems, because of limited technical and financial assistance in Tennessee.

2. Specific data collection procedures were developed and implemented to supplement the 1982 National Resource Inventory, in order to secure statistically acceptable base data for Tennessee. This resulted in base data that was statistically reliable to the county level being available for use in planning.

3. For cropland, eight evaluation units were established based on areas with similar resource characteristics which require similar land treatment practices or systems of practices to achieve various levels of resource protection. The evaluation units are described in Appendix B. Various applicable land treatment practices were incrementally analyzed to determine which practice or combination thereof would provide maximum net benefits. Interdependent practices, such as components of stripcropping or outlets for terraces were evaluated as a single practice. The procedure was carried out for each of the eight evaluation units.

Benefits attributable to land treatment practices were based on improving and/or maintaining the productivity of the soil resource base. Economic evaluations of alternatives were conducted by determining the level of erosion damage reduction for both on-site and off-site areas. Yield estimates and production cost were determined for each evaluation unit for problem-free conditions. These estimates were considered for the current time period and a projected 25 years hence. Yields and production costs for current and the 25-year projected time period were determined for conditions without project development. Results of these conditions were compared with results as determined for the problem-free conditions. The difference was considered as erosion damages. This same procedure was applied to each suggested land treatment practice, in order to determine its impact toward damage reduction.

4. For gullies and degrading ditches, the evaluation considered damages to fixed improvements, permanent land damage and land damage subject to recovery. An incremental analysis approach was used in determining the most cost-effective means for stabilization.

5. The evaluation process for land treatment practices for erosion control on roadbanks included the costs for various plant types to be used as cover which were included in the incremental analysis.

Factors Which Affected the Above Processes: For cropland, numerous factors influenced which land treatment practices were selected for consideration for each evaluation unit. Soil Conservation Service policy, soils, crops grown, existing land treatment practices, types of erosion (sheet and rill or ephemeral gullies, or both), yields and acceptability were considered. For evaluation units 1 through 6, conservation tillage systems, contour stripcropping, grasses and legumes in rotation, terraces, grade stabilization structures and grassed waterways or outlets were considered to be practical and acceptable treatments. Cropland conversion to grass and/or trees was the only treatment considered for evaluation units 7 and 8.

For gullies and degrading ditches, treatment considerations included: critical area planting, grade stabilization structures and water and sediment control basins.

Critical area planting was considered as the most practical means for stabilizing eroding roadbanks.

Evaluation and Comparison of Alternative Plans

Alternative plans were developed in accordance with established planning criteria by grouping similar land treatment practices from individual evaluation units to create resource management systems for problem cropland. Alternative plans for problem solutions for eroding roadbanks, gullies and ditches were developed through consideration of various means for stabilization. Basic considerations included critical area planting and construction of sediment basins.

The without-project conditions were evaluated, and the National Economic Development (NED) Plan was developed. It was determined that this NED plan also qualified as the Resource Protection (RP) Plan. Participation is expected to be about 80 percent on cropland and 100 percent on gullies, ditches and roadbanks.

Alternative No. 1
No Project Action

Components: None

Cost: $0.00

Effects: Excessive soil erosion would continue at an average rate of 50 tons per acre annually on 240,160 cropland acres causing damages of about $5,798,960 annually. About 9,350 acres of gullies and degrading ditches would continue to cause annual damages of an estimated $420,750. Annual damages totaling $32,250 would continue to occur as a result of excessive erosion from 430 acres of eroding roadbanks. Excessive erosion, averaging about 7 tons per acre annually, would continue to occur on 6,840 acres of other lands.

Alternative No. 2
National Economic Development and Resource Protection Plan

Components: This alternative plan provides for the treatment of 192,140 cropland acres, 9,350 acres of large gullies and degrading ditches and 430 acres of eroding roadbanks. Components by evaluation unit are shown in Table F.

Costs: Total treatment cost - $37,962,610
Other - $29,559,400. Local - $8,403,210
Average per-acre cost -- $188.00
Average annual cost -- $4,003,650

Effects: Implementation of this alternative would provide total annual benefits of $9,215,140 [1/] (Table G) and reduce soil erosion on 201,920 acres. Average annual erosion would be reduced by approximately 76 percent. Alternatives are summarized and compared in Table H.

1/ Annual benefits do not reflect discounting and allowance for lag in accrual.

TABLE F - COMPONENTS OF THE NATIONAL ECONOMIC DEVELOPMENT AND RESOURCE PROTECTION PLAN
Hatchie River Basin Land Treatment Plan
Tennessee

Evaluation Unit	Future Conditions "Without" Problem Acres	Annual Erosion (1,000 Tons)	Rate/AC	Acres Not To be Treated [1/]	Acres To be Treated	Plan Components	Remaining Annual Erosion (1,000 Tons)	Reduced Annual Erosion (1,000 Tons)	Percent Reduction
Cropland									
1	6,360	44	7	1,270	5,090	Conservation Tillage Systems & Cover & Green Manure Crop	24	20	45
2	4,330	164	38	860	3,470	Contour Stripcropping #1 & Conservation Tillage Systems & Terrace System	40	124	76
3	76,810	2,611	34	15,360	61,450	Conservation Tillage Systems & Terrace Systems	707	1,904	73
4	11,510	414	36	2,300	9,210	Contour Stripcropping #1 & Conservation Tillage Systems & Grassed Waterways or Outlets	129	285	69
5	80,280	3,840	48	16,050	64,230	Contour Stripcropping #2 & Conservation Tillage Systems & Waterways or Outlets	1,027	2,813	73
6	26,130	1,515	58	5,230	20,900	Contour Stripcropping #2 & Conservation Tillage Systems & Grassed Waterways or Outlets	408	1,107	73
7	1,000	204	204	200	800	Pasture and Hayland Planting	43	161	79
8	33,740	3,273	97	6,750	26,990	Pasture and Hayland Planting	709	2,564	78
Cropland Total	240,160	12,065	(50)	48,020	192,140		3,087	8,978	(74)
Gullies & Ditches	9,350	1,047	112	--	9,350	Critical Area Planting, Grade Stabilization Structures, Water and Sediment Basins	46	1,001	96
Roadbanks	430	56	130	--	430	Critical Area Planting	2	54	96
Other	6,840	48	7	6,840	--	- - - - - - - - - - - - - - - - - -	48	--	--
Grand Total	256,780	13,216	(51)	54,860	201,920		3,183	10,033	(76)

[1/] Based on approximate 80 percent participation rate on cropland and 100 percent participation rate on gullies, ditches and roadbanks.

TABLE G - ANNUAL BENEFITS - NATIONAL ECONOMIC DEVELOPMENT AND RESOURCE PROTECTION PLAN
Hatchie River Basin Land Treatment Plan
Tennessee

Evaluation Unit	Future Conditions "Without" Problem Acres	Annual Erosion (1,000 Tons)	Rate/AC	Acres 1/ Not To be Treated	Acres To be Treated	Plan Components	Total Annual Benefits On-Site	Off-Site
Cropland								
1	6,360	44	7	1,270	5,090	Conservation Tillage Systems & Cover & Green Manure Crop	96,250	570
2	4,330	164	38	860	3,470	Contour Stripcropping #1 & Conservation Tillage Systems & Terrace System	170,900	3,530
3	76,810	2,611	34	15,360	61,450	Conservation Tillage Systems & Terrace Systems	3,126,580	54,200
4	11,510	414	36	2,300	9,210	Contour Stripcropping #1 & Conservation Tillage Systems & Grassed Waterways or Outlets	161,540	8,110
5	80,280	3,840	48	16,050	64,230	Contour Stripcropping #2 & Conservation Tillage Systems & Waterways or Outlets	2,205,660	65,440
6	26,130	1,515	58	5,230	20,900	Contour Stripcropping #2 & Conservation Tillage Systems & Grassed Waterways or Outlets	745,920	31,520
7	1,000	204	204	200	800	Pasture and Hayland Planting	63,500	4,600
8	33,740	3,273	97	6,750	26,990	Pasture and Hayland Planting	1.981,070	72,990
Cropland Total	240,160	12,065	(50)	48,020	192,140		8,551,420	240,960
Gullies & Ditches	9,350	1,047	112	--	9,350	Critical Area Planting, Grade Stabilization Structures, Water and Sediment Basins	368,160	12,410
Roadbanks	430	56	130	--	430	Critical Area Planting	31,610	10,580
Other	6,840	48	7	6,840	--			
Grand Total	256,780	13,216	(51)	54,860	201,920		8,951,190	263,950

1/ Based on approximate 80 percent participation rate on cropland and 100 percent participation rate on gullies, ditches and roadbanks.

TABLE H - SUMMARY AND COMPARISON OF ALTERNATIVE PLANS

Hatchie River Basin Land Treatment Plan
Tennessee

Effects	Alternative No. 1 1/ No Project Action	Alternative No. 2 National Economic Development and Resource Protection Plan		
Practices				
Cropland		Conservation Tillage Systems	80,240	Acres
		Cover and Green Manure Crop	1,310	Acres
		Control Stripcropping #1	12,680	Acres
		Contour Stripcropping #2	85,130	Acres
		Grassed Waterways or Outlets	94,340	Acres
		Terrace Systems	64,920	Acres
		Pasture and Hayland Planting	27,790	Acres
		Cropland Total	192,140	Acres
Gullies and Ditches		Critical area Planting, Grade Stabilization Structures, Water and Sediment Basins	9,350	Acres
Roadbanks		Critical Area Planting	430	Acres
		Project Totals	201,920	Acres
Project Investment	$0	$37,962,610		
National Economic Development Account				
Adverse, Annualized	-	$4,003,650		
Beneficial, Annualized	-	$6,336,000		
Net Beneficial	-	$2,332,350		
Environmental Quality Account				
Upland Wildlife Habitat	Degraded by excessive erosion and loss of food/cover on 384,530 acres.	Improve habitat quality by reducing food and cover sources on 201,920 treated acres.		
Bottomland Wildlife Habitat	Degraded by excessive sedimentation on approximately 20,000 acres of forested wetlands.	Reduce erosion sources on cropland, gullies, ditches and roadbanks, and reducing sediment deposition.		
Forest Land	Sediment damaged and/or killed forests total approximately 210 acres per year.	Controls sources of sediment on 201,920 upland acres.		

(Continued on Next Page)

Continued from Previous Page:

Effects	Alternative No. 1 1/ No Project Action	Alternative No. 2 National Economic Development and Resource Protection Plan
Water Quality	Excessive levels of phosphorous and other adsorbed pollutants and degraded water quality.	Control adsorbed pollutants by reducing soil erosion on 201,920 acres.
Stream Fishery Resources	Instream habitats are degraded by excessive sediment deposition.	Reduce sediment deposition by reducing soil erosion on 201,920 acres.
Other Social Effects		
Account		
On-Site	Excessive soil erosion occurs on 240,160 cropland acres.	Provide adequate protection on 192,140 cropland acres. Reduce cropland erosion by 74 percent. Reduce croplend erosion damages by 80 percent.
	Erosion problem caused by 9,350 acres of gullies and degrading ditches. Annual damages amount to $420,750.	Provide for adequate protection on 9,350 acres of gullies and ditches. Reduce annual damages by 87.5 percent.
	Erosion problem on 430 roadbank acres. Annual dameges amount to $32,250.	Provide for adequate protection on 430 roadbank acres. Reduce annual damages by 98 percent.
Off-Site	Swamping problem on 28,340 cropland and pastureland acres. Annual damages amount to $382,540.	Reduce cropland and pastureland damages by 69 percent.
Regional Economic Development Account		
Positive Effect		
Annuelized		
Region		$6,336,000
Rest of Nation		0
Negative Effect		
Annualized		
Region		$ 886,230
Rest of Nation		$3,117,420

1/ Based on future conditions after effects of ongoing programs.
Interest Rates - All alternatives evaluated at 8-5/8 percent interest for 35 years.
Price Levels - Current 1986 price levels except current normalized (November 12, 1985) used for crops.

Project Interaction

There are no known planned or proposed Federal or non-Federal projects or actions that will significantly affect the recommended plan.

Risk and Uncertainty

Land owners' and operators' participation is a major concern directly related to the success of the recommended plan. Many land owners and operators will have to make major changes in their farming operations in order for the plan to be successful. Anticipated benefits will not be fully realized unless the projected 80 percent participation on cropland and 100 percent of the other planned treatment is achieved.

Rationale for Plan Selection

Major objectives are to reduce on-site and off-site damages resulting from excessive erosion. Alternative 2 meets the objectives, protects the soils resource base and qualifies as the National Economic Development and Resource Protection Plan.

RECOMMENDED PLAN

General

The recommended plan consists of planning and applying land treatment practices on 192,140 cropland acres, 9,350 acres of gullies and degrading ditches and 430 acres of eroding roadbanks. Applicable land treatment practices include conservation tillage systems, contour stripcropping, pasture and hayland planting, terraces, grassed waterways or outlets, cover and green manure crops, critical area planting, grade stabilization structures and water and sediment control basins. Implementation of this recommended plan will significantly reduce the identified problems resulting from excessive soil erosion.

Purpose and Summary

This plan is selected and recommended, in order to solve or alleviate the identified problems resulting from erosion and sedimentation. The purposes are to identify the significant problems which cannot be solved adequately or in a timely manner without accelerated assistance and to outline financial and technical assistance needed to solve or alleviate identified problems.

Plan Elements

Table F displays the recommended land treatment practices by major land use and/or conditions. For cropland areas, quantities of practices are based on an 80 percent land user participation rate, while a 100 percent participation rate is expected for gullies, ditches and roadbanks.

Mitigation Features

There have been no mitigation needs identified for this project. The planning process included the consideration of potential impacts on wetlands, water quality, fish and wildlife resources and other environmental concerns. No negative impacts were identified which would merit mitigation efforts.

Permits and Compliance

No permits will be required for implementation of the land treatment practices.

Costs

The estimated project installation cost is shown in Table 1. Costs for land treatment practices include proposed one-time incentive payments, construction cost, technical assistance costs and project administration costs.

The one-time incentive payments consist of $60.00 per acre for the conservation tillage system for 121,160 cropland acres. Total incentive payments of $7,269,600 would be borne by other funds.

Construction costs include terrace systems, conservation cropping systems, contour stripcropping, critical area planting, sediment basins, grade stabilization structures, establishing vegetation on roadbanks and gullies, establishment cost for pasture and hayland planting where permanent conversion is expected and other items incidental to installation of the recommended land treatment practices. These estimated construction costs are $22,519,770 of which $14,637,870 are proposed to be borne by other funds.

Technical assistance costs include the services of technical personnel of involved agencies for the planning and application of conservation plans. Also included are the services of engineers and other technicians for surveys, investigations, designs and preparation of plans and specifications for land treatment practices and preparation of operation and maintenance plans. Technical assistance funds of $6,683,770 would be needed from other funds.

Project administration costs include the costs of long-term contract administration, government representatives and other contract administration. The estimated cost for project administration is $1,489,470, of which $968,160 would be other funds and $521,310 would be local funds.

The total project cost is estimated at $37,962,610.

Installation and Financing

Responsibilities for installation of the recommended plan, contractual arrangements and the installation schedule are described in this subsection. Installation is proposed over a 10-year period. Table I displays yearly installation cost obligations.

TABLE I - SCHEDULE OF OBLIGATIONS

Hatchie River Basin Land Treatment Plan
Tennessee

Year	Financial Assistance		Project Administration		Technical Assistance		Total
	Other $	Local $	Other $	Local $	Other $	Local $	$
1	1,673,220	598,260	58,090	31,280	489,060	--	2,849,910
2	3,191,820	1,141,230	135,540	72,980	1,304,150	--	5,845,720
3	5,423,980	1,939,340	193,630	104,260	1,304,150	--	8,965,360
4	6,540,070	2,338,380	222,680	119,900	1,304,150	--	10,525,180
5	2,812,740	1,054,610	135,540	72,980	652,080	--	4,727,950
6	837,060	299,290	58,090	31,280	652,080	--	1,877,800
7	546,880	195,530	58,090	31,280	326,040	--	1,157,820
8	429,690	153,630	58,090	31,280	326,040	--	998,730
9	295,760	105,750	29,040	15,640	163,020	--	609,210
10	156,250	55,880	19,370	10,430	163,000	--	404,930
	21,907,470	7,881,900	968,160	521,310	6,683,770	--	37,962,610

Project agreements between the suppliers of the other funds and the local sponsors, and long-term contracts between the sponsors and landowners or operators, will be used to provide cost-share assistance for installation of the land treatment practices on cropland, gullies and degrading ditches.

Project agreements shall detail the working arrangements and applicable operating regulations between suppliers of the other funds and the sponsoring local organizations. The suppliers of the other funds will need to execute a project agreement with the sponsoring local organizations. These agreements should identify the parties involved, their responsibilities and the amount of project funds to be encumbered. These agreements can be the fund-obligating documents. Project agreements can support the kinds, amounts and general locations of land treatment practices.

The suppliers of other funds are expected to provide technical assistance for planning and the initial implementation of the land treatment practices. Assurance for continued use and/or application of the practices by landowners and operators will be the responsibility of the sponsoring local organizations.

Individual landowners and operators who wish to participate in the program would apply for assistance with the local sponsoring organizations. Cost-sharing arrangements should be based on long-term contracts (LTC's) between the sponsoring organization and individual landowners and operators to install the practices. Conservation plans approved by local soil conservation districts should be used as the basis for writing LTC's.

LTC's can be prepared to include land treatment practices for all inventoried needs for an entire farm. Cost-sharing should be limited to elimination and/or reduction of identified resource problems as discussed in the Problem and Opportunity Identification section of this document. Substitute practices may be selected by the farm owner or operator. However, cost-share amount should be limited to the amount for implementing the specific practice or combination of practices as included in this document determined as the most cost effective. Maximum cost share per acre is based on the average cost per acre for practices by evaluation units. This includes land treatment practices which provide for control of sheet, rill and ephemeral gully erosion and adequate means for water disposal. Price adjustments should be made during the implementation period to allow for inflation. Specific practices for individual farm units will need to be determined by the planner on site with the landowner and/or operator. The length of the LTC's should be between 3 and 10 years, with all practices being installed at least 2 years prior to the end of the contract.

The project agreement executed between the providers of the funds and sponsoring local organizations should detail certification requirements and contracting procedures before final cost is agreed upon. Eligibility for cost-sharing may also be considered as valid in cases where landowner's or operator's decision, within the LTC, is to immediately implement only a portion of the recommended practices for his farm, while agreeing to implement the remaining portion later within the project

implementation period. In such cases, cost-share funds for the latter portion would not be disbursed to the landowner or operator until those practices are implemented.

A division of work arrangement should be used for roadbank stabilization work. Other funds will be used to furnish materials and to pay for the rental of mulch spreaders with operators and application materials. Concerned units of government in cooperation with local soil conservation districts should furnish, as needed, all labor and equipment for the transportation of materials to the work sites and for the grading, shaping, seedbed preparation and application of fertilizer and seed. The value of the work performed using other funds should not exceed cost sharing rates for such practices applicable under other cost share programs.

No relocations are anticipated as a result of the project.

It is recommended that policies and procedures be followed for protecting cultural resources as outlined in the Soil Conservation Service's General Manual (GM) 420, Part 401. No cultural resource sites are expected to be affected by the project.

Operation and Maintenance

The local sponsoring organization, as identified in LTC's, and landowners and operators should be responsible for the operation and maintenance of practices installed on cropland, gullies and ditches at an estimated cost of $1,443,850 annually. The involved units of county government should be responsible for operation and maintenance of roadbank work estimated at $580 annually.

The $1,443,850 cost includes $1,425,740 for croplands and $18,110 for gullies and degrading ditches. For practices on cropland, operation and maintenance work include application of fertilizer and reseeding grassed waterways. Cost differences for practices such as conservation tillage systems, pasture and hayland planting, contour stripcropping and other conservation cropping systems are accounted for in crop budgets. The $18,110 cost for operation and maintenance work for planned land treatment practices to stabilize gullies and ditches, includes such actions as annual applications of fertilizer to maintain vegetative cover, replanting trees, seeding, repairing structural elements to prevent deterioration and vegetative control of undesirable plants.

Roadbank stabilization operation and maintenance should be carried out by involved units of government in cooperation with conservation districts. Detailed plans should be developed and recorded in operation and maintenance agreements. Needed work will include shaping, reseeding and fertilization to maintain a permanent vegetative cover.

The total annual operation and maintenance cost is $1,444,430.

Opportunities for Implementation

The recommended plan was developed by using basic prescribed procedures for the preparation of land treatment plans for watershed protection under Public Law 83-566. The total plan, however, is currently ineligible for funding under this law due to the size of the planning area.

Several means can be pursued to secure funding for implementing the total plan or portions of it by study sponsors, concerned conservation districts and organizations and interested individuals. These include:

(1) Secure special Federal funding under Public Law 97-98, the Agriculture and Food Act of 1981, Title XV Resource Conservation, Sub-title B - Special Areas Conservation Program and/or Subtitle D - Matching Grants for Conservation Activities.

(2) Encourage the state of Tennessee and/or local units of government to allocate funds that can be used for incentive payments, cost-sharing and the providing of technical assistance.

(3) Promote the acceleration of special and ongoing programs such as (a) land treatment for watershed protection projects for selected hydrologic units under Public Law 83-566; (b) the Chickasaw-Shiloh Resource Conservation and Development Program; (c) the 208 Clean Water Program; (d) targeting by USDA agencies; and (e) special projects under the Land and Water 201 Regional Resource Conservation Program.

(4) Secure approval for a follow-up river basin study to (a) prioritize basin watersheds according to damages resulting from erosion and sedimentation and (b) prepare preauthorization reports on watersheds, with the greatest damages, that can be used by local sponsors to request authorization for land treatment for watershed protection projects under Public Law 83-566.

TABLE 1 - ESTIMATED INSTALLATION COST

Hatchie River Basin Land Treatment Plan
Tennessee

Installation Cost Item	Unit	Non-Federal Land 2/	Estimated Cost (Dollars) 1/ Other Funds	Local Funds	Total
Land Treatment for Erosion Control					
Cropland 3/	Acres	192,140	19,958,580	6,832,500	26,791,080
Gullies and Ditches	Acres	9,350	1,711,310	921,480	2,632,790
Roadbanks	Acres	430	237,580	127,920	365,500
Totals		201,920	21,907,470	7,881,900	29,789,370
Technical Assistance					
Cropland			6,040,270	--	6,040,270
Gullies and Ditches			611,500	--	611,500
Roadbanks			32,000	--	32,000
			6,683,770	--	6,683,770
Project Administration					
Cropland			870,710	468,840	1,339,550
Gullies and Ditches			85,570	46,070	131,640
Roadbanks			11,880	6,400	18,280
			968,160	521,310	1,489,470
Project Totals		201,920	29,559,400	8,403,210	37,962,610

April 1986

1/ Price Base 1986.
2/ There is no Federal land involved.
3/ See Table 1A for listing of land treatment practices and cost share for cropland acres.

TABLE 1A - CONSERVATION PRACTICES AND COST-SHARE
Hatchie River Basin Land Treatment Plan
Tennessee

Evaluation Unit and Practices	Unit	Number	Unit Cost	Application Cost	Funds	
					Other	Local
			----------Dollars----------			
1						
Conservation Tillage Systems	Acres	3,780	60.00	226,800	226,800	--
Cover and Green Manure Crops	Acres	1,310	7.50	9,830	6,390	3,440
		5,090		236,630	233,190	3,440
2						
Contour Stripcropping #1	Acres	3,470	14.00	48,580	31,580	17,000
Conservation Tillage Systems	Acres	(2,830)	60.00	169,800	169,800	--
Terraces	Acres	(3,470)	125.00	433,750	281,940	151,810
		3,470		652,130	483,320	168,810
3						
Conservation Tillage Systems	Acres	40,920	60.00	2,455,200	2,455,200	--
Terraces	Acres	(61,450)	187.00	11,491,150	7,469,250	4,021,900
		61,450		13,946,350	9,924,450	4,021,900
4						
Contour Stripcropping #1	Acres	9,210	14.00	128,940	83,810	45,130
Conservation Tillage Systems	Acres	6,140	60.00	368,400	368,400	--
Grassed Waterways or Outlets	Acres	(9,210)	45.00	414,450	269,390	145,060
		9,210		911,790	721,600	190,190
5						
Contour Stripcropping #2	Acres	64,230	17.00	1,091,910	709,740	382,170
Conservation Tillage Systems	Acres	48,680	60.00	2,920,800	2,920,800	--
Grassed Waterways or Outlets	Acres	(64,230)	45.00	2,890,350	1,878,730	1,011,620
		64,230		6,903,060	5,509,270	1,393,790
6						
Contour Stripcropping #2	Acres	20,900	17.00	355,300	230,950	124,350
Conservation Tillage Systems	Acres	(18,810)	60.00	1,128,600	1,128,600	--
Grassed Waterways or Outlets	Acres	(20,900)	57.00	1,191,300	774,350	416,950
		20,900		2,675,200	2,133,900	541,300
7						
Pasture and Hayland Planting	Acres	800	52.75	42,200	27,430	14,770
8						
Pasture and Hayland Planting	Acres	26,990	52.75	1,423,720	925,420	498,300
Totals		192,140		26,791,080	19,958,580	6,832,500

TABLE 2 - ANNUALIZED ADVERSE NED EFFECTS
Hatchie River Basin Land Treatment Plan
Tennessee 1/
(Dollars)

Accelerated Land Treatment	Project Outlays Annualized Install. Cost 2/	Operation Maint. & Replac. 3/	Total
Cropland Evaluation Unit			
1	20,710	--	20,710
2	55,240	37,640	92,880
3	1,199,150	898,020	2,097,170
4	78,260	35,640	113,900
5	593,820	350,930	944,750
6	230,160	103,510	333,670
7	4,600	--	4,600
8	119,700	--	119,700
Cropland Total	2,301,640	1,425,740	3,727,380
Gullies & Ditches	226,180	18,110	244,290
Roadbanks	31,400	580	31,980
Totals	2,559,220	1,444,430	4,003,650

1/ Price Base 1986, discounted and annualized at 8-5/8 percent discount rate for 35 years.
2/ Includes cost for technical assistance, project administration and installation costs.
3/ Does not include recurring costs, since they have been accounted for in crop budgets.

TABLE 3 - ESTIMATED ANNUAL EROSION DAMAGE REDUCTION BENEFITS
Hatchie River Basin Land Treatment Plan
Tennessee
(Dollars) 1/

	Acres	Estimated Annual Damages 2/ Without Project	Estimated Annual Damages 2/ With Project	Damage Reduction Benefit 2/
On-Site Damages				
Cropland				
Evaluation Unit				
1	6,360	15,900	3,180	12,720
2	4,330	37,110	7,370	29,740
3	76,810	939,390	187,850	751,540
4	11,510	178,060	35,580	142,480
5	80,280	1,759,740	351,820	1,407,920
6	26,130	836,160	167,360	668,800
7	1,000	43,290	8,660	34,630
8	33,740	1,989,310	397,980	1,591,330
Cropland Total	240,160	5,798,960	1,159,800	4,639,160
Gullies & Ditches	9,350	420,750	52,590	368,160
Roadbanks	430	32,250	640	31,610
On-Site Total	256,780	6,251,960	1,213,030	5,038,930

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	Acres	Estimated Annual Damages [2] Without Project	Estimated Annual Damages [2] With Project	Damage Reduction Benefit [2]
Off-Site Damages				
Cropland [3]				
Evaluation Unit				
1		1,290	720	570
2		4,820	1,290	3,530
3		76,810	22,610	54,200
4		12,180	4,070	8,110
5		112,970	47,530	65,440
6		44,570	13,150	31,520
7		6,000	1,400	4,600
8		96,300	23,310	72,990
Cropland Total	XXXX	354,940	113,980	240,960
Gullies & Ditches [3]	XXXX	15,000	2,590	12,410
Roadbanks [3]	XXXX	12,600	2,020	10,580
Off-Site Total	28,340 [4]	382,540	118,590	263,950
Grand Totals	285,120	6,635,500	1,331,620	5,302,800

April 1986

1/
2/ Price Base 1986
3/ Figures do not reflect discounting and lag period.
4/ Off-site damages are prorated to upland areas.
Off-site acreage of crop and pasture.

TABLE 4 - COMPARISON OF NED BENEFITS AND COSTS
Hatchie River Basin Land Treatment Plan
Tennessee
(Dollars)

	Damage Reduction		Increased Returns and Reduced Production Outlays [2]	Total Annual Benefits [3]	Annualized [4]		Benefit Cost Ratio
	Erosion	Sediment			Benefits	Costs	
Cropland Evaluation Unit							
1	12,720	570	83,530	96,820	66,500	20,710	3.2:1.0
2	29,740	3,530	141,160	174,430	119,810	92,880	1.3:1.0
3	751,540	54,200	2,375,040	3,180,780	2,184,810	2,097,170	1.0:1.0
4	142,480	8,110	19,060	169,650	116,530	113,900	1.0:1.0
5	1,407,920	65,440	797,740	2,271,100	1,559,970	944,750	1.7:1.0
6	668,800	31,520	77,120	777,440	534,010	333,670	1.6:1.0
7	34,630	4,600	28,870	68,100	46,780	4,600	10.2:1.0
8	1,591,330	72,990	389,740	2,054,060	1,410,900	119,700	11.8:1.0
Cropland Total	4,639,160	240,960	3,912,260	8,792,380	6,039,310	3,727,380	1.6:1.0
Gullies & Ditches	368,160	12,410	--	380,570	261,670	244,290	1.1:1.0
Roadbanks	31,610	10,580	--	42,190	35,020	31,980	1.1:1.0
Grand Total	5,038,930	263,950	3,912,260	9,215,140	6,336,000	4,003,650	1.6:1.0

April 1986

1/
2/ Price Base 1986
3/ Increased net returns and reduced or eliminated crop production costs
4/ Annual benefits before discounting and allowance for lag in accrual
Discounted and annualized at 8-5/8 percent discount rate for 35 years

EFFECTS OF THE RECOMMENDED PLAN

General

Implementation of the recommended plan will significantly reduce the annual damages resulting from erosion and sedimentation; improve farm operation efficiencies; improve water quality conditions; enhance fish and wildlife habitat and improve aesthetic values. The benefit-cost ratio is estimated at 1.6:1.0.

Benefits will accrue consistently as recommended land treatment practices are installed during the installation period.

Average annual benefits are estimated at $6,336,000, of which $6,154,520 will accrue on-site, while about $181,480 will accrue within the off-site areas. On-site benefits will be realized through reduced damages resulting from reduced crop yields, land voiding and increased annual maintenance. Additional benefits will be realized through reduced crop production costs and more efficient use of lands. Offsite monetary benefits will result primarily from reduced annual damages to cropland and pastureland on flood plain lands. Off-site benefits were allocated to upland land uses in accordance with expected levels of reduced erosion tonnage and locations. Average annual benefits are displayed in Table 4 by major land use and/or condition and by evaluation units.

Sheet, rill and ephemeral gully erosion on 192,140 cropland acres will be reduced from an average of 50 tons per acre annually to an average of about 3.6 tons per acre annually. Gross erosion on 9,350 acres of gullies and degrading ditches will be reduced from an average of 112 tons per acre annually to an average of 5 tons per acre. Gross erosion on 430 acres of roadbanks will be reduced from 130 tons per acre annually to an average of 4.6 tons per acre annually. Erosion reduction by evaluation unit and major land use is shown in Table J.

Several environmental conditions will be benefitted as a result of recommended plan implementation. These benefits are summarized in Table K. Effects of the Recommended Plan on Resources of Principal National Recognition.

This plan provides for a 76 percent reduction of basin-wide gross erosion. The plan will have no effect on cultural resources

Relationship to Land and Water Resource Plans, Policies and Controls

This plan is compatible with the objectives of the long-range plans of the concerned soil conservation districts.

CONSULTATION AND PUBLIC PARTICIPATION

On September 29, 1981, a meeting was held in the Estes Kefauver Federal Building - U.S. Courthouse in Nashville to allow U.S.D.A. planning personnel representing the Soil Conservation Service, Forest Service and Economic Research Service to meet with sponsors and concerned agencies to

TABLE J - EROSION REDUCTION BY EVALUATION UNIT AND MAJOR LAND USE
Hatchie River Basin Land Treatment Plan
Tennessee

	Without Plan		With Recommended Plan			Erosion Reduction
			Acres			
	Acres 1/	Annual Erosion (1,000 Tons)	To Be Treated	Not to be Treated 2/	Annual Erosion (1,000 Tons)	(1,000 Tons)
Cropland Evaluation Unit						
1	6,360	44	5,090	1,270	24	20
2	4,330	164	3,470	860	40	124
3	76,810	2,611	61,450	15,360	707	1,904
4	11,510	414	9,210	2,300	129	285
5	80,280	3,840	64,230	16,050	1,027	2,813
6	26,130	1,515	20,900	5,230	408	1,107
7	1,000	204	800	200	43	161
8	33,740	3,273	26,990	6,750	709	2,564
Cropland Total	240,160	12,065	192,140	48,020	3,027	8,978
Gullies & Ditches	9,350	1,047	9,350	--	46	1,001
Roadbanks	430	56	430	--	2	54
Other	6,840	48	--	6,840	48	--
Grand Totals	256,780	13,216	201,920	54,860	3,183	10,033

April 1986

1/ Problem acres after impacts of ongoing programs
2/ Based on expressed percentages of expected participation rates

TABLE K - EFFECTS OF THE RECOMMENDED PLAN ON RESOURCES
OF PRINCIPAL NATIONAL RECOGNITION

Hatchie River Basin Land Treatment Plan
Tennessee

Type of Resources	Principal Sources of National Recognition	Measurement of Effects
Air Quality	Clean Air Act, as amended (42 U.S.C. 1857h-7 et seq.).	No effect
Areas of Particular Concern within the Coastal Zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.)	Not present in planning area
Endangered and Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	No effect (see Appendix B)
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	No effect on habitat quantity. Increase habitat quality by approximately 15 percent on treated acres (HQI)
Flood Plains	Executive Order 11988, Flood Plain Management	Reduce area of timber damaged by 47 percent
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq)	No effect
Prime and Unique Farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act. Farmland Protection Polcy Act of 1981.	Improve 192,140 acres by erosion reductions from 50 tons per acre per year to about 3.6 tons per acre per year.
Water Quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq)	Improved water quality through sediment/pollutant reductions in lower 180 river miles with no change in state classification.
Wetlands	Executive Order 11990, Protection of Wetlands. Clean Water Act of 1977 (42 U.S.C. 1857h-7, et seq)	Preserve current classification of approximately 210 acres per year of forested wetlands.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq)	No effect

review study objectives and revise them as necessary to meet current needs. Twenty-six people attended, representing 14 agencies and organizations.

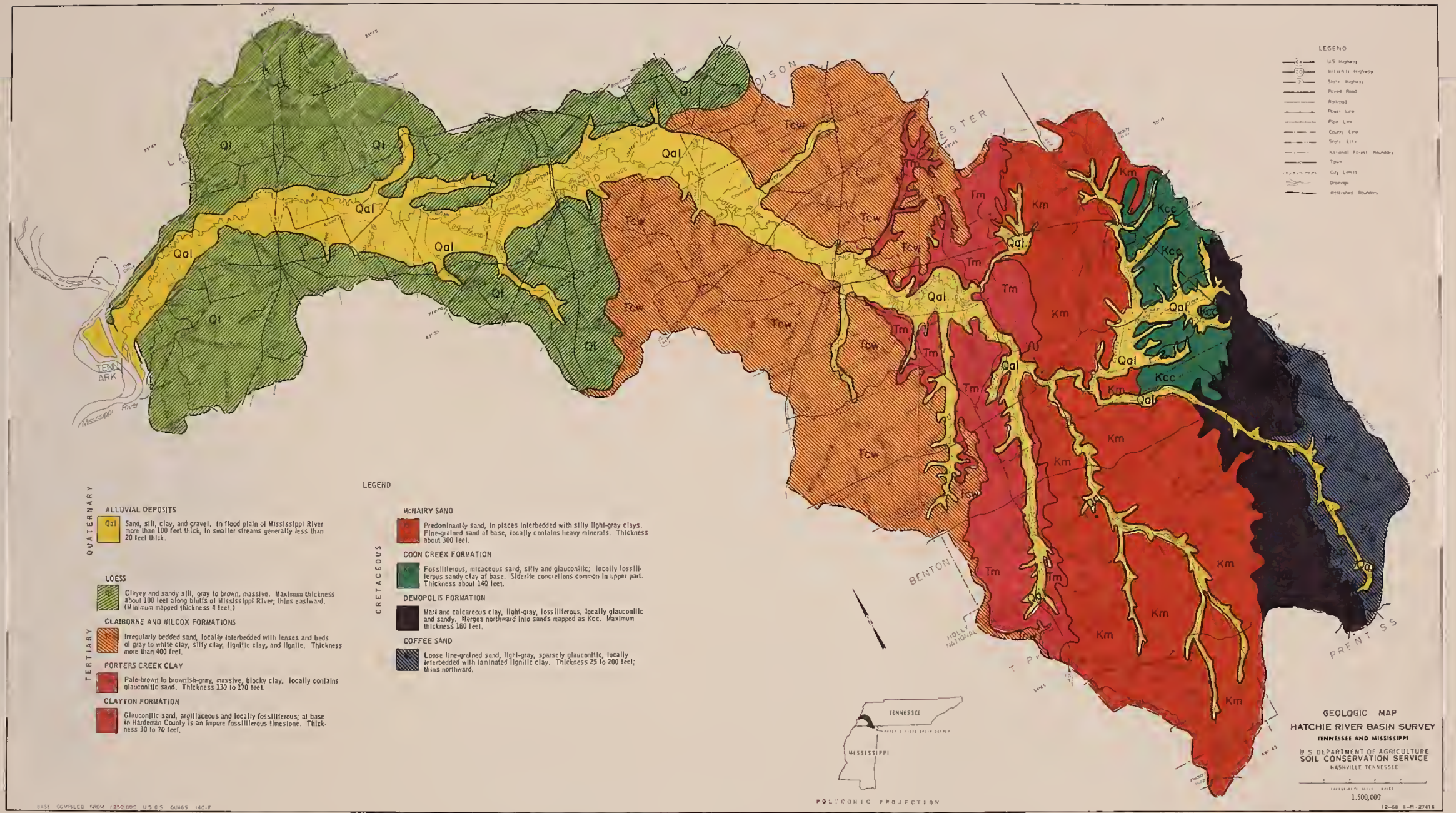
A meeting was held in the auditorium of the Bolivar Electric Department at Bolivar, Tennessee, on March 28, 1983. The purpose of the meeting was to announce progress to date on the study and for scoping purposes. Over 40 interested individuals attended and participated.

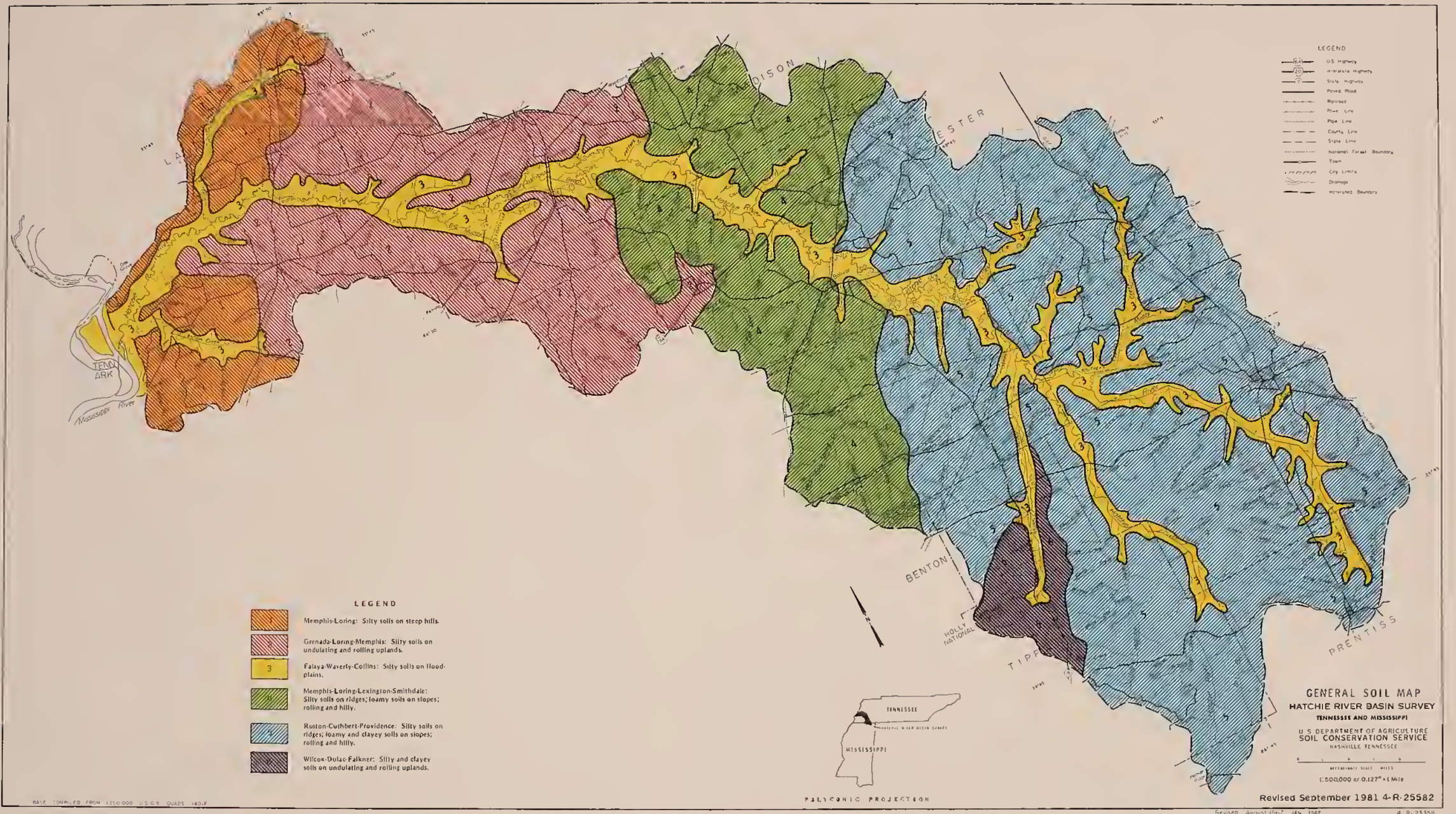
Numerous other formal and informal meetings and planning sessions were held throughout the planning process. They were attended by sponsors' representatives, land owners and operators and representatives of various concerned local, state and Federal agencies and organizations.

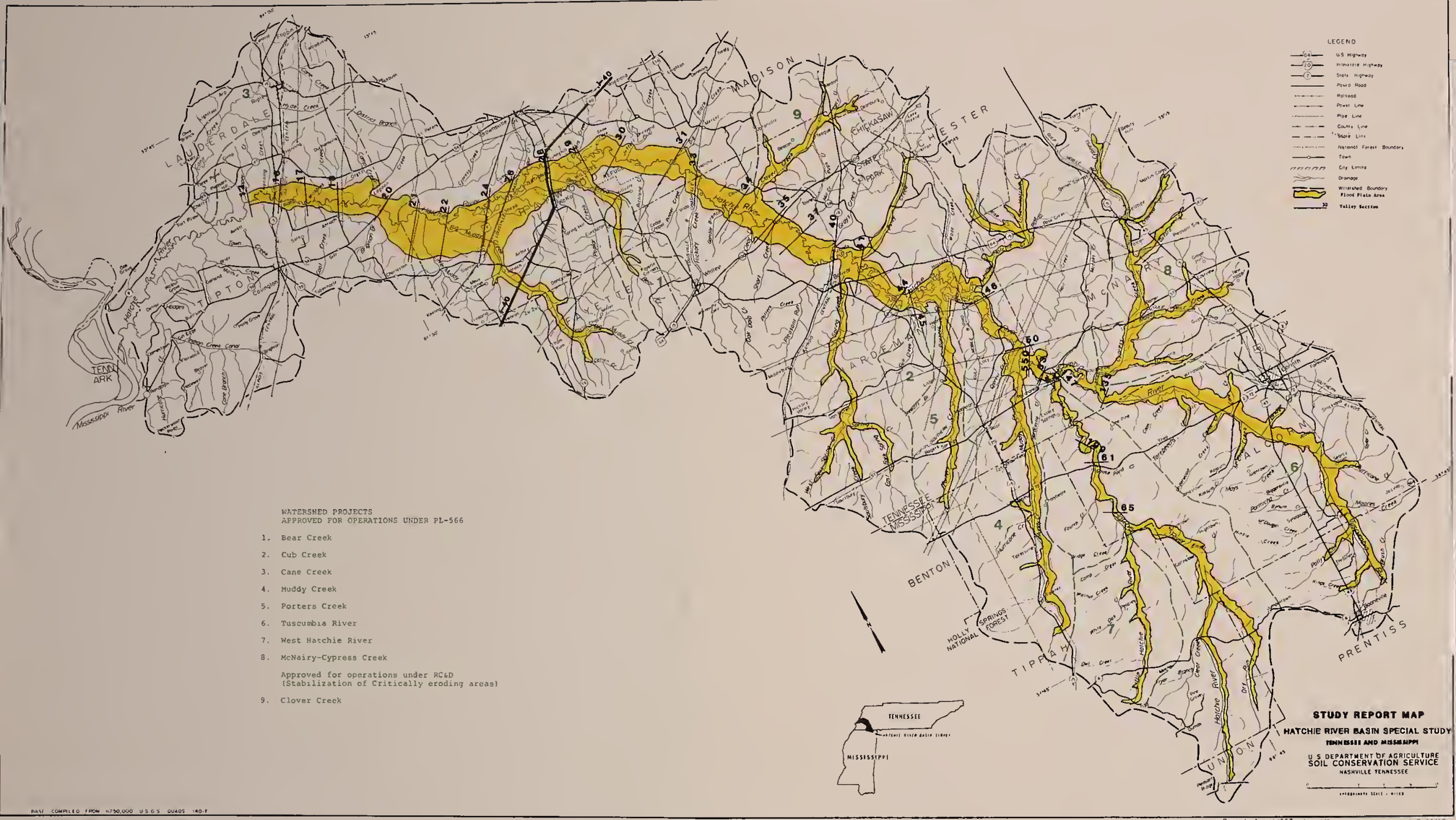
APPENDICES

APPENDIX A

MAPS


LEGEND
QUATERNARY
ALLUVIAL DEPOSITS
Qal
Sand, silt, clay, and gravel. In flood plain of Mississippi River more than 100 feet thick; in smaller streams generally less than 20 feet thick.
LOESS
Clayey and sandy silt, gray to brown, massive. Maximum thickness about 100 feet along bluffs of Mississippi River; thins eastward. (Minimum mapped thickness 4 feet.)
TERTIARY
CLAIBORNE AND WILCOX FORMATIONS
Irregularly bedded sand, locally interbedded with lenses and beds of gray to white clay, silty clay, lignitic clay, and lignite. Thickness more than 400 feet.
PORTERS CREEK CLAY
Pale-brown to brownish-gray, massive, blocky clay, locally contains glauconitic sand. Thickness 130 to 170 feet.
CLAYTON FORMATION
Glauconitic sand, argillaceous and locally fossiliferous; at base in Hardeman County is an impure fossiliferous limestone. Thickness 30 to 70 feet.
LEGEND
CRETACEOUS
McNAIRY SAND
Predominantly sand, in places interbedded with silty light-gray clays. Fine-grained sand at base, locally contains heavy minerals. Thickness about 300 feet.
COON CREEK FORMATION
Fossiliferous, micaceous sand, silty and glauconitic; locally fossiliferous sandy clay at base. Siderite concretions common in upper part. Thickness about 140 feet.
DEMOPOLIS FORMATION
Marl and calcareous clay, light-gray, fossiliferous, locally glauconitic and sandy. Merges northward into sands mapped as Kcc. Maximum thickness 180 feet.
COFFEE SAND
Loose fine-grained sand, light-gray, sparsely glauconitic, locally interbedded with laminated lignitic clay. Thickness 25 to 200 feet; thins northward.
LEGEND
U.S. Highway
Interstate Highway
State Highway
Paved Road
Railroad
Power Line
Pipe Line
County Line
State Line
National Forest Boundary
Town
City Limits
Drainage
Watershed Boundary
Qal
Ql
Tcw
Tm
Km
Kcc
Kc
Kd
TENNESSEE
MISSISSIPPI
Mississippi River
BENTON
PRENTISS
HOLLY SPRINGS NATIONAL FOREST
POLYCONIC PROJECTION
GEOLOGIC MAP
HATCHIE RIVER BASIN SURVEY
TENNESSEE AND MISSISSIPPI
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NASHVILLE TENNESSEE
1,500,000
BASE COMPILED FROM 1:250,000 U.S.G.S. QUADS 140-F
USDA-SCS-FORT WORTH, TEXAS 1961
Revised August 1967 JAN 1967
12-68 A-M-27414
A-R 23358


LEGEND
US Highway
Interstate Highway
State Highway
Paved Road
Railroad
Power Line
Pipe Line
County Line
State Line
National Forest Boundary
Town
City Limits
Drainage
Watershed Boundary
LEGEND
Memphis-Loring: Silty soils on steep hills.
Grenada-Loring-Memphis: Silty soils on undulating and rolling uplands.
Falaya-Waverly-Collins: Silty soils on flood-plains.
Memphis-Loring-Lexington-Smithdale: Silty soils on ridges; loamy soils on slopes; rolling and hilly.
Ruston-Cuthbert-Providence: Silty soils on ridges; loamy and clayey soils on slopes; rolling and hilly.
Wilcox-Dulac-Falkner: Silty and clayey soils on undulating and rolling uplands.
TENNESSEE
MISSISSIPPI
POLYCONIC PROJECTION
GENERAL SOIL MAP
HATCHIE RIVER BASIN SURVEY
TENNESSEE AND MISSISSIPPI
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NASHVILLE TENNESSEE
1:500,000 or 0.127" = 1 Mile
Revised September 1981 4-R-25582
BASE COMPILED FROM 1:250,000 U.S.G.S. QUADS 140-F
USDA SCS-FORT WORTH TEXAS 1981
Revised August (for) JAN 1982
4-R-23358


LEGEND
U.S Highway
Interstate Highway
State Highway
Paved Road
Railroad
Power Line
Pipe Line
County Line
State Line
National Forest Boundary
Town
City Limits
Drainage
Watershed Boundary
Flood Plain Area
Valley Section
WATERSHED PROJECTS
APPROVED FOR OPERATIONS UNDER PL-566
1. Bear Creek
2. Cub Creek
3. Cane Creek
4. Muddy Creek
5. Porters Creek
6. Tuscumbia River
7. West Hatchie River
8. McNairy-Cypress Creek
Approved for operations under RC&D
(Stabilization of Critically eroding areas)
9. Clover Creek
TENNESSEE
MISSISSIPPI
STUDY REPORT MAP
HATCHIE RIVER BASIN SPECIAL STUDY
TENNESSEE AND MISSISSIPPI
U.S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NASHVILLE TENNESSEE
BASE COMPILED FROM 1:250,000 U.S.G.S QUADS 140-F
Revised August 1967 JAN 1967
4 R 23358

APPENDIX B

SUPPORTING DATA

INCREMENTAL ANALYSES OF BENEFITS AND COSTS PER ACRE BY EVALUATION UNITS
Hatchie River Basin Land Treatment Plan
Tennessee

Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year) Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
1	5,090	Without Plan	7	--	--	--	--	--	--	--	--	--
		Iteration #1										
		Conservation Tillage Systems	5	--	2	--	5.92	17.35	2.93	5.92	17.35	11.43
		Cover and Green Manure Crop	6	--	1	--	.74	1.83	2.48	.74	1.83	1.09
		Iteration #2										
		Conservation Tillage Systems	5									
		Conservation Tillage Systems and Cover and Green Manure Crop	3	--	2	--	.74	1.56	2.11	6.66	18.91	12.25
2	3,470	Without Plan	9	29	--	--	--	--	--	--	--	--
		Iteration #1										
		Contour Strip-cropping #1	6	12	3	17	1.38	24.72	17.91	1.38	24.72	23.34
		Conservation Tillage Systems	6	12	3	17	5.92	13.84	2.34	5.92	13.84	7.92
		Terrace Systems	7	0 3/	2	29	14.16	35.60	2.51	14.16	35.60	21.44
		Iteration #2										
		Contour Strip-cropping #1	6	12								
		Contour Strip-cropping & Conservation Tillage Systems	3	9	3	3	5.92	11.66	1.97	7.30	36.38	29.08
		Contour Strip-cropping & Terraces	6	0	0	12	12.75	16.81	1.32	14.13	41.53	27.40

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Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year) Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
2		Iteration #3										
		Contour Strip-cropping & Conservation Tillage Systems	3	9								
		Contour Strip-cropping & Conservation Tillage Systems & Terraces	2	0	1	9	11.35	12.87	1.13	18.65	49.25	30.60
3	61,450	Without Plan	14	20	—	—	—	—	—	—	—	—
		Iteration #1										
		Conservation Tillage Systems	6	10	8	10	5.92	25.88	4.37	5.92	25.88	19.96
		Contour Strip-cropping #1	5	9	9	11	1.38	17.79	12.89	1.38	17.79	16.41
		Terrace Systems	7	0	7	20	23.60	38.23	1.62	23.60	38.23	14.63
		Iteration #2										
		Conservation Tillage Systems	6	10								
		Conservation Tillage Systems & Contour Strip-cropping	3	7	3	3	1.38	6.84	4.96	7.30	32.72	25.42
		Conservation Tilage Systems & Terraces	3	0	3	10	18.50	25.00	1.35	24.42	50.88	26.46

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Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year) Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
4	9,210	Without Plan	15	21	—	—	—	—	—	—	—	—
		Iteration #1										
		Conservation Tillage Systems	10	13	5	8	5.92	8.43	1.42	5.92	8.43	2.51
		Contour Strip-cropping #1	9	12	6	9	1.38	4.52	3.28	1.38	4.52	3.14
		Terrace Systems	10	0	5	21	18.50	17.97	.97	18.50	17.97	(-).53
		Grassed Waterways or Outlets	11	0	4	21	4.54	7.26	1.60	4.54	7.26	2.72
		Iteration #2										
		Contour Strip-cropping #1	9	12								
		Contour Strip-cropping & Conservation Tillage Systems	6	10	3	2	5.92	7.57	1.28	7.30	12.09	4.79
		Contour Strip-cropping Waterways	7	0	2	12	4.54	6.00	1.32	5.92	10.52	4.60
		Iteration #3										
		Contour Strip-cropping & Conservation Tillage Systems	6	10								
		Contour Strip-cropping & Conservation Tillage Systems & Grassed Waterways or Outlets	5	0	1	10	4.54	5.45	1.26	11.84	17.54	5.70

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Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year) Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
5	64,230	Without Plan	22	26	—	—	—	—	—	—	—	—
		Iteration #1										
		Conservation Tillage Systems	13	22	9	4	5.92	15.49	2.61	5.92	15.49	9.57
		Contour Strip-cropping #2	10	20	12	6	1.68	15.08	8.98	1.68	15.08	13.40
		Grassed Waterways or Outlets	17	0	5	26	4.54	9.11	2.01	4.54	9.11	4.57
		Terrace Systems	14	0	8	26	29.50	28.87	.97	29.50	28.87	(-).63
		Iteration #2										
		Contour Strip-cropping #2	10	20								
		Contour Strip-cropping #2 Conservation Tillage	7	12	3	8	5.92	13.26	2.23	7.60	28.34	20.74
		Contour Strip-cropping #2 Grassed Waterways or Outlets	9	0	1	20	4.54	7.15	1.57	6.22	22.23	16.01
		Iteration #3										
		Contour Strip-cropping #2 & Conservation Tillage Systems	7	12								
		Contour Strip-cropping & Conservation Tillage Systems & Grassed Waterways or Outlets	4	0	3	12	4.54	6.00	1.32	12.14	34.34	22.20

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Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year) Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
6	20,900	Without Plan	34	24								
		Iteration #1										
		Conservation Tillage Systems	16	22	18	2	5.92	17.99	3.04	5.92	17.99	12.07
		Contour Strip-cropping #2	15	20	19	4	1.68	13.22	7.87	1.68	13.22	11.54
		Grassed Waterways or Outlets	18	0	16	24	5.63	9.00	1.60	5.63	9.00	3.37
		Iteration #2										
		Conservation Tillage Systems	16	22								
		Conservation Tillage Systems & Contour Strip-cropping #2	8	10	8	12	1.68	10.50	6.25	7.60	28.49	20.89
		Conservation Tillage Systems & Grassed Waterways or Outlets	12	0	4	22	5.63	8.10	1.44	11.55	26.09	14.54
		Iteration #3										
		Conservation Tillage Systems & Stripcropping #2	8	10								
		Conservation Tillage Systems & Contour Strip-cropping & Grassed Waterways or Outlets	5	0	3	10	5.63	7.20	1.28	13.23	35.69	22.46

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Unit 1/	Total Acres	Land Treatment Practices	Erosion (Tons/Acre/Year Amount Sheet & Rill	Amount Ephemeral 2/	Reduction Sheet & Rill	Reduction Ephemeral	Annual Cost Per Acre	Annual Benefits Per Acre	Benefits Per Dollar Cost	Total Dollars Costs	Total Dollars Benefits	Net Dollar Benefits
7	800	Without Plan	44	160	—	—	—	—	—	—	—	—
		Iteration #1										
		Pasture and Hayland Planting	2	1	42	159	5.21	79.37	15.23	5.21	79.37	74.16
		Tree Planting	2	0	42	160	5.92	41.50	7.01	5.92	41.50	35.58
8	26,990	Without Plan	65	32	—	—	—	—	—	—	—	—
		Iteration #1										
		Pasture and Hayland Planting	2	1	63	31	5.21	73.40	14.09	5.21	73.40	68.19
		Tree Planting	2	0	63	32	5.92	35.53	6.00	5.92	35.53	29.61

1/ Evaluation unit descriptions are attached.
2/ Ephemeral gully erosion (prorated over all acres within the evaluation unit).
3/ 0 rate indicates prorated rate is less than 1 ton over all acres.

GLOSSARY

Conservation District - A subdivision of the state organized pursuant to the state soil conservation district law, as amended. Conservation districts are locally created, operated and controlled by an elected and appointed governing body, made up of resident land users.

Land Treatment Practice - A measure commonly used to meet a specific need in planning and carrying out soil and water conservation programs for which standards and specifications have been developed. May also be referred to as conservation land treatment practices. Nonstructural conservation practices include conservation tillage, grasses and legumes in rotation and stripcropping. Structural practices include terraces and sediment basins.

Conservation Plan - A collection of material containing land user decisions and information requested by the land user for the conservation of soil, water and related plant and animal resources for all or part of the operating unit.

Conservation Tillage System - Any tillage and planting system that maintains at least 30 percent of the soil surface covered by residue after planting to reduce soil erosion by water.

Cropland - Land that is primarily used for the production of adapted cultivated and close-growing crops for harvest, alone or in association with sod crops.

Evaluation Units - Areas with similar characteristics which require similar systems of practices to achieve various levels of resource protection.

Forest Land - Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be reforested.

Grassed Waterways or Outlets - A natural or constructed waterway or outlet shaped or graded and established in vegetation suitable to safely dispose runoff from a field, diversion, terrace or other structure.

Habitat Quality Index (HQI) - A numerical rating (0.0 - 1.0) based on life requisites of target species (i.e., largemouth bass, whitetail deer, etc.) and reflecting the abilities of an area (habitat type) to provide these requisites. Generalized ratings of the series are; 0.85 - 1.0 = excellent, 0.70 - 0.84 = good, 0.55 - 0.69 = fair, and 0.00 - 0.54 = poor.

Implementation - The act of carrying out or executing decisions made during planning.

Incremental Analysis - A systematic approach to formulating cost-effective plans for achieving various levels of resource protection using the technique of layering conservation practices.

Landowner(s) or Operator(s) - Those who use land, individually or collectively, as owners, operators, lessors, renters, occupiers or by other arrangements that give them conservation planning and implementation concern and responsibility for the land involved. This responsibility includes the authority to reach decisions for conservation treatment.

Local Funds - Funds provided by local sponsors and land owners and operators.

Long-Term Contract (LTC) - A document that provides the basis for a land user to receive cost-sharing for applying conservation practices. The document includes a plan/schedule of operations and cost-sharing provisions.

National Economic Development (NED) Plan - The alternative plan that reasonably maximizes net economic benefits.

Ongoing Programs - Existing Federal, State and local programs which provide cost-sharing and/or incentives for the installation of land treatment practices.

Other Funds - Funds provided by the Federal and/or state government.

Other Land - Land not covered under the definition of other land uses. Basically in this plan "other land" refers to areas that are used for residences, idle or in miscellaneous use.

Pasture and Hayland Planting (land use conversion) - Establishing long-term stands of adapted species of perennials and biennials on fields that previously have been used for cropland.

Pastureland - Land that is primarily used for the production of adapted domesticated forage plants for livestock.

Resource Base - Soil, Water and related plant and animal resources. To protect the resource base, SCS field office technical guides are used in selecting alternatives for meeting tolerable soil losses, maintaining water quality and avoiding further deterioration and as necessary, improving forest, range and wildlife resources.

Resource Management System - A combination of conservation practices identified by the primary use of land or water that, if installed, will at a minimum protect the resource base by meeting tolerable soil losses, maintaining acceptable water quality and maintaining acceptable ecological and management levels for the selected resource use. Resource management systems, in addition, may include conservation practices that provide for quality in the environment and quality in the standard of living.

SCS Technical Assistance - Help provided to individuals on opportunities, potentials and problems having to do with soil and water resources. Includes planning, application and maintenance.

Contour Stripcropping - Growing crops in a systematic arrangement of strips or bands on the contour to reduce erosion. Stripcropping #1 as used in this document refers to three strips of row crops (soybean/wheat, corn and cotton) arranged in strips to include: 50 percent soybean/wheat, 25 percent corn and 25 percent cotton. Stripcropping #2 as used in this document refers strips of row crops based on existing row crop percentage less 10 percent for grassed buffer strips.

Terraces - An earth embankment, channel or a combination ridge and channel constructed across a slope. As used in this document, "terraces" is used to designate resource management systems, including terraces and interdependent practices necessary for a complete resource management system.

Wetlands - Those areas described in Circular 39, Wetlands of the United States, Fish and Wildlife Service, 1956.

DESCRIPTIONS OF EVALUATION UNITS

Hatchie River Basin Land Treatment Plan
Tennessee

Evaluation units are defined as being areas with similar characteristics which require similar systems of practices to achieve various levels of resource protection.

EVALUATION UNIT 1

Consists of well drained and moderately well drained coastal plain and loessial soils on gently sloping or rolling upland areas. Slopes average 2 to 5 percent, with a predominant slope of 3 percent. The average slope length is 100 feet. Soil losses average about 7 tons per acre annually from sheet and rill erosion. There is no identifiable ephemeral gully erosion.

Adequate terrace systems exist on this unit, however, additional land treatment practices are needed to solve the problems resulting from sheet and rill erosion. The land capability subclass is IIe.

EVALUATION UNIT 2

Similar to evaluation unit 1, however, the ephemeral gully erosion has only been partially treated. Land treatment practices are needed to control sheet, rill and ephemeral gully erosion.

The predominant slope is 3 percent, with an average slope length of about 125 feet. Gross annual erosion averages 38 tons per acre from the combined effects of sheet, rill and ephemeral gully erosion.

Straight row cotton produced on about 25 percent of this acreage is a major contributing factor to the high erosion rates. The land capability subclass is IIe.

EVALUATION UNIT 3

Similar to evaluation units 1 and 2, with deep and well drained soils located on gently rolling upland areas. These soils are highly productive when well managed. Slopes range from 2 to 5 percent, with predominant slopes of 3 percent. The average slope length is 125 feet.

Total gross erosion averages 34 tons per acre from the combined effects of sheet, rill and ephemeral gully erosion. About 5 percent of this unit's acreage presently has some kind of land treatment practice present, generally in the form of winter cover or green manure crops. Resource management systems, to control sheet, rill and ephemeral gully erosion are needed. The land capability subclass is IIe.

EVALUATION UNIT 4

The coastal plain and loessial soils located on gently sloping hillsides in this unit are generally deep and well drained. The soils are moderately productive when well managed. Slopes range from 2 to 8 percent, with a predominant slope of 5 percent. The average slope length is about 125 feet.

The combined annual erosion rates from sheet, rill and ephemeral gully erosion is estimated at 36 tons per acre. Additional land treatment practices are needed to adequately control soil erosion. The land capability subclass is IIIe.

EVALUATION UNIT 5

Similar to evaluation unit 4, however no land treatment practices are currently in use. Resource management systems consisting of terrace systems, grassed waterways or outlets or sediment basins are required to support conservation cropping systems and to control ephemeral gully erosion.

The typical annual erosion rate is 48 tons per acre from the combined effects of sheet, rill and ephemeral gully erosion. The land capability subclass is IIIe.

EVALUATION UNIT 6

Generally occurs on sloping hillsides, with slopes ranging from 5 to 8 percent. The predominant slope is 7 percent, with average slope lengths of 125 feet. The soils are severely eroded and are marginally productive under good management.

Resource management systems consisting of terrace systems, sediment basins and grassed waterways or outlets are needed, in addition to improved conservation cropping systems to control or prevent sheet, rill and ephemeral gully erosion.

The combined erosion rate from all types of erosion is about 58 tons per acre. The land capability subclass is IVe.

EVALUATION UNIT 7

Consists of soils on moderately sloping to strongly sloping hillsides. The soils are generally well drained, but shallow. Slopes range from 8 to 10 percent, with 10 percent being predominant. The average slope length is about 100 feet.

No land treatment practices are currently in use. The soils are not normally capable of economical crop production even under good management. Steepness of slope is a hinderance to the adequate prevention of soil erosion when continuously cropped.

Conversion from cropland to grass or trees is required for adequate erosion control. Total annual erosion is estimated at 204 tons per acre from the combined effects of sheet, rill and ephemeral gully erosion. The land capability subclasses are VIe and VIIe.

EVALUATION UNIT 8

Similar to evaluation unit 7, however, some attempts have been made to reduce erosion. Partial terrace systems and contour farming are being applied. Net returns from crops are less than production costs. The average erosion rate is 97 tons per acre annually from the combined effects of sheet, rill and ephemeral gully erosion.

As with evaluation unit 7, conversion to grass or trees is required for adequate erosion control. The land capability subclasses are VIe and VIIe.

WETLANDS OF THE HATCHIE RIVER BASIN

Hatchie River Basin Land Treatment Plan
Tennessee

Classification (Circular #39) 1/	Classification (FWS/OBS - 79/31) 2/	Percentage of Total Wetlands 3/	Approximate Acreage in Hatchie River Basin 3/
1	PEM, PEM1A, PFO1A	37.20	70,680
3	PEMF, PEM1F, PSS/EM (Part)	0.05	95
4	PABF	0.03	57
6	PSS1C/A/F, PFO/SS, PSS/EM (Part)	1.00	1,900
7	PFO (All except permanently flooded)	61.72	117,268
	ESTIMATED TOTALS	100.00	190,000

1/ Shaw, S. P. and C. G. Fredine. 1956. Wetlands of the United States. USFWS, Circular #39. 67 pp.

2/ Cowardin, L. M., V. Carter, F. C. Golet and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. USFWS. FWS/OBS - 79/31. 103 pp.

3/ Based on Sample (Approximately 50 percent) Utilizing Aerial Photographs (ASCS), National Wetland Inventory Map Products (FWS) and Ground Truthing (SCS).

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ENDANGERED SPECIES FIELD STATION
100 OTIS STREET, ROOM 224
ASHEVILLE, NORTH CAROLINA 28801

January 16, 1986

Mr. Donald C. Bivens
State Conservationist
U.S. Department of Agriculture
Soil Conservation Service
675 U.S. Courthouse
Nashville, Tennessee 37203

Re: 4-2-84-651

Dear Mr. Bivens:

We have reviewed the biological assessment regarding the gray bat and red-cockaded woodpecker for the Hatchie River Basin Special Study in Lauderdale, Chester, Tipton, Haywood, Fayette, Madison, Hardeman, and McNairy Counties, Tennessee, submitted January 15, 1986.

The biological assessment is adequate and supports the conclusion of no effect with which we concur. In view of this, we believe that the requirements of Section 7 of the Endangered Species Act have been satisfied. However, obligations under Section 7 of the Act must be reconsidered if (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner which was not considered in this biological assessment, or (3) a new species is listed or critical habitat determined that may be affected by the identified action.

Your interest and initiative in enhancing endangered and threatened species is appreciated.

Sincerely yours,

Warren T. Parker
Field Supervisor

cc:
Mr. Bob Hatcher, Tennessee Wildlife Resources Agency, Nashville, TN
Program Administrator, Tennessee Heritage Program, Nashville, TN
Field Supervisor, ES, FWS, Cookeville, TN